RECLAMATION

Managing Water in the West

2019 Colorado River Annual Operating Plan

Colorado River Management Work Group
First Consultation
May 30, 2018

U.S. Department of the Interior
Bureau of Reclamation

2019 Colorado River AOP
First Consultation Meeting

- Welcome and Introductions – *Malcolm Wilson / Steve Hvinden*
- Upper Basin Hydrology and Operations – *Paul Davidson*
- Lower Basin Hydrology and Operations – *Rich Eastland*
- 2019 AOP Review Process – *Malcolm Wilson / Steve Hvinden*
- Review of Draft 2019 AOP – *CRMWG*
- Wrap-up and Next Steps
- Reminder of Future Meeting Dates

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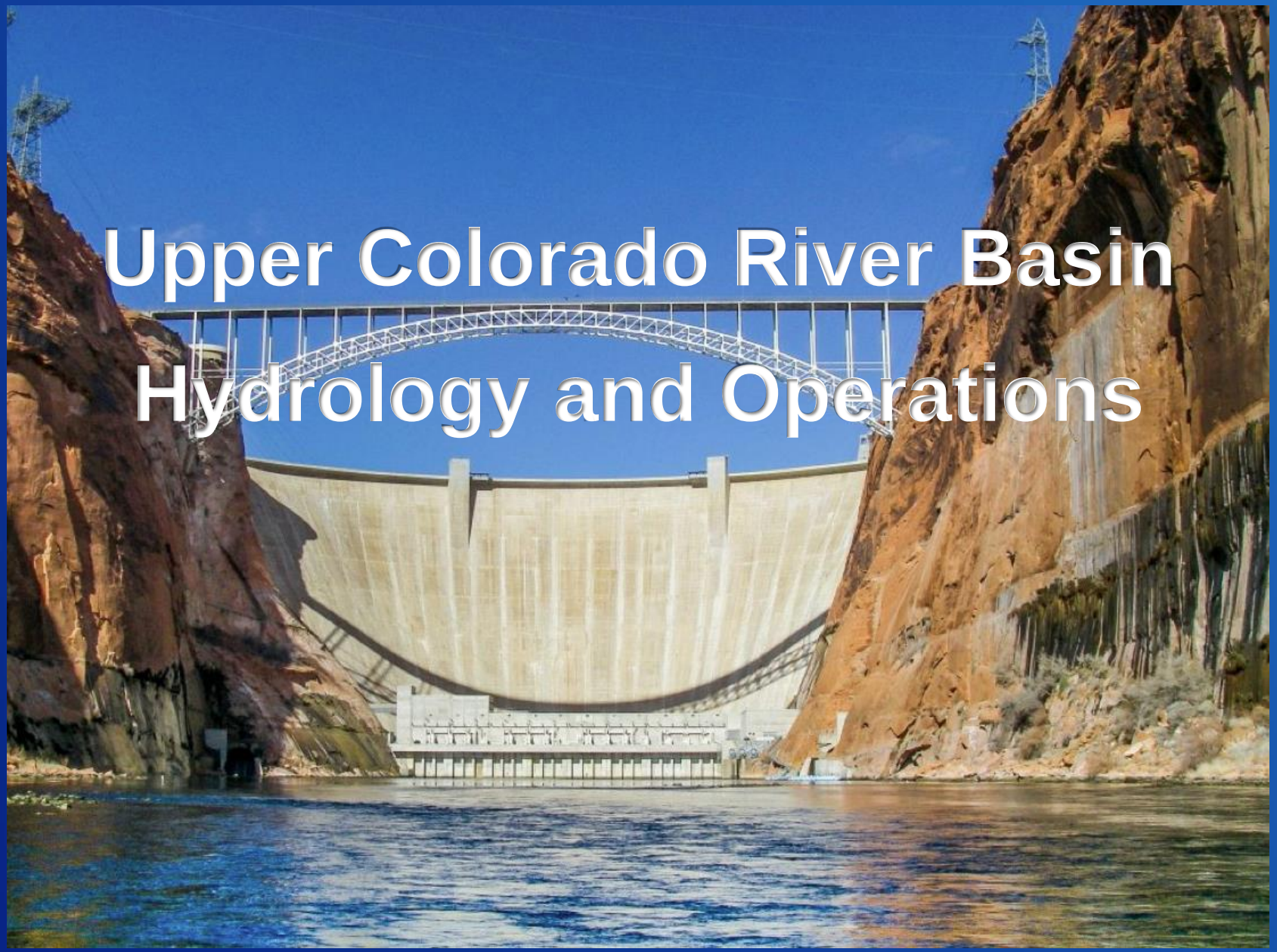

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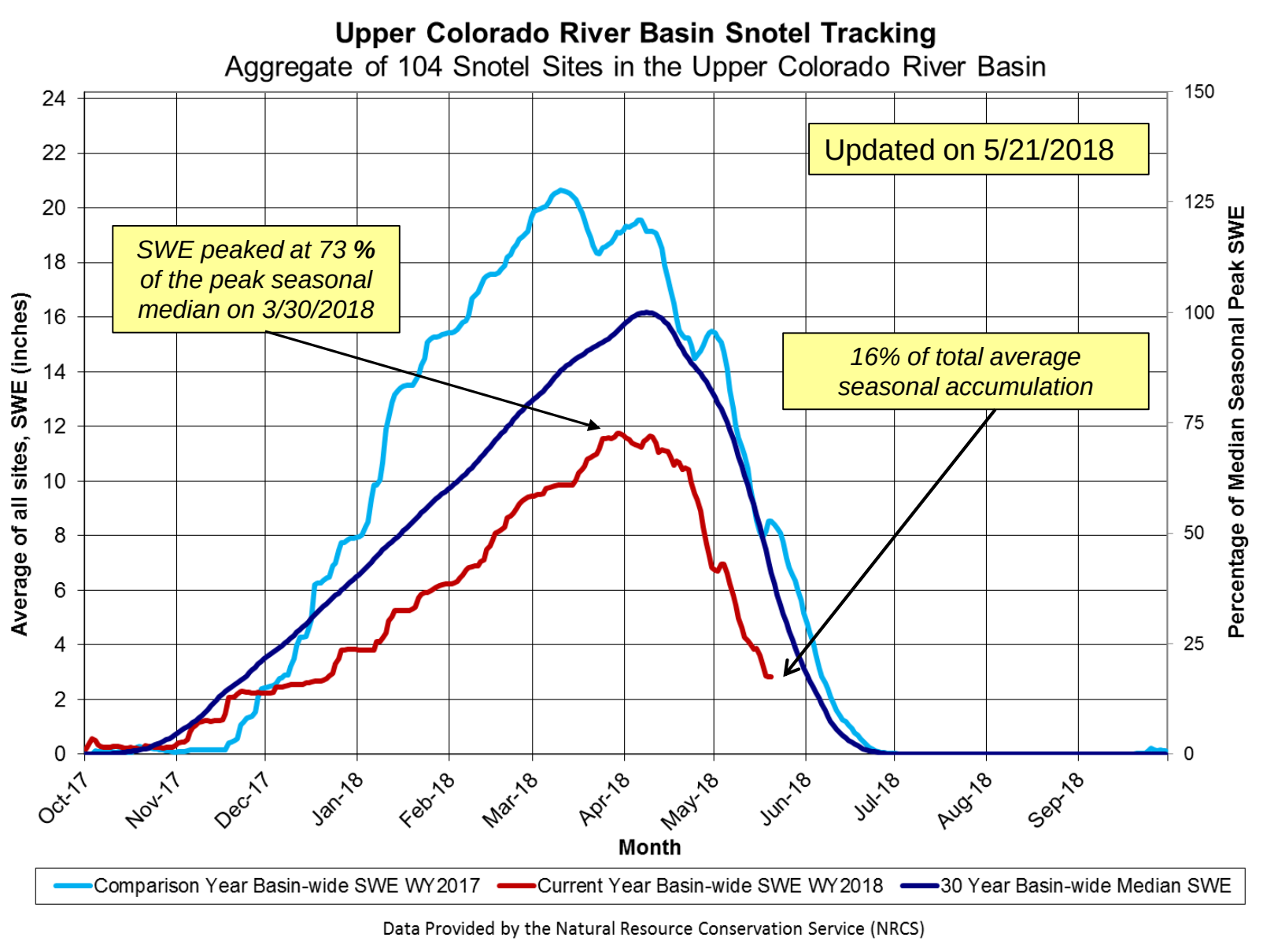
Snow Conditions



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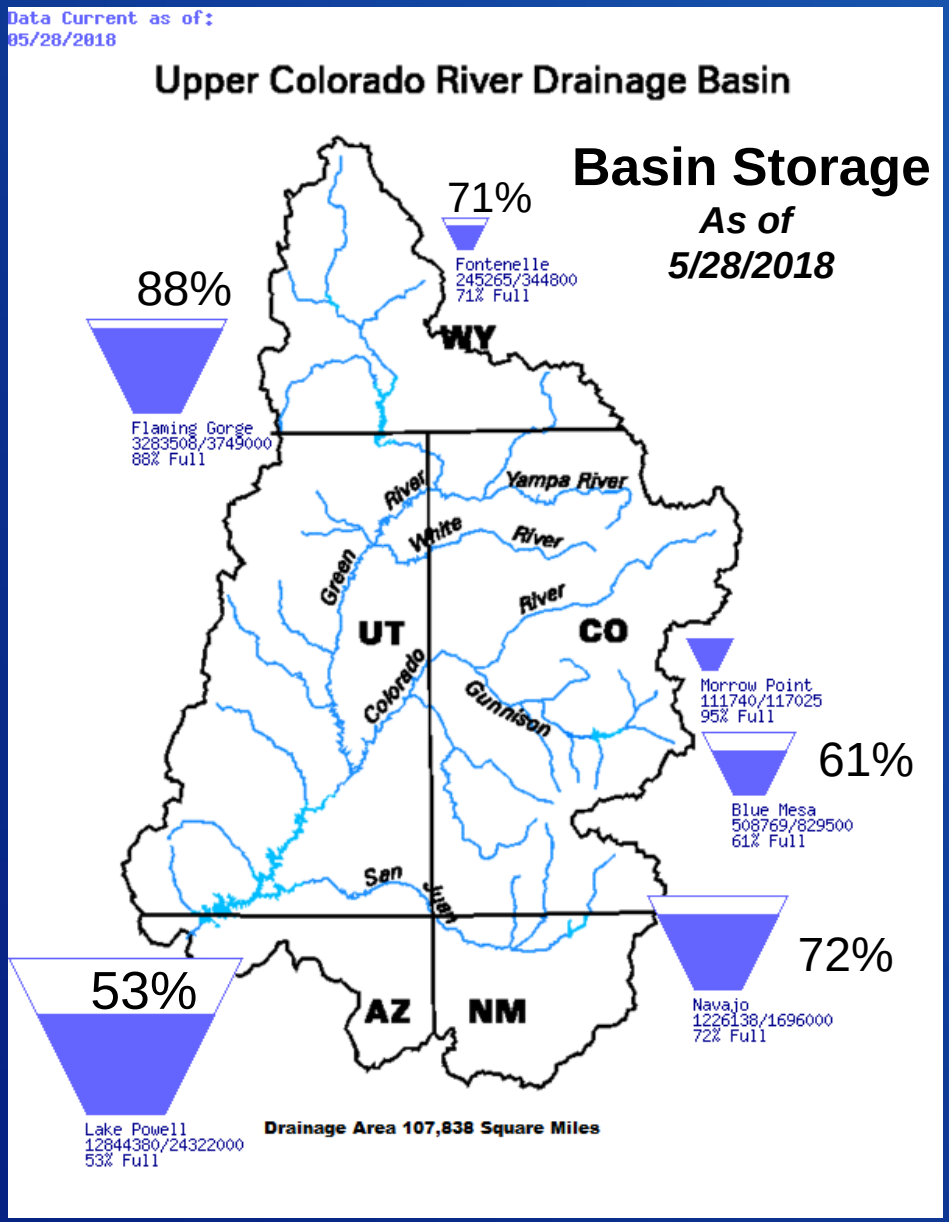
Upper Basin Storage



https://www.usbr.gov/uc/water/basin/index.html

2018 April to July Inflow Forecast

Issued May 2, 2018

Reservoir	A-J Forecast (KAF)	Percent of Average[1]
Fontenelle	900	124%
Flaming Gorge	1,000	102%
Blue Mesa	350	52%
Navajo	200	27%
Powell	3,000	42%

[1] percent of average based on period 1981-2010.

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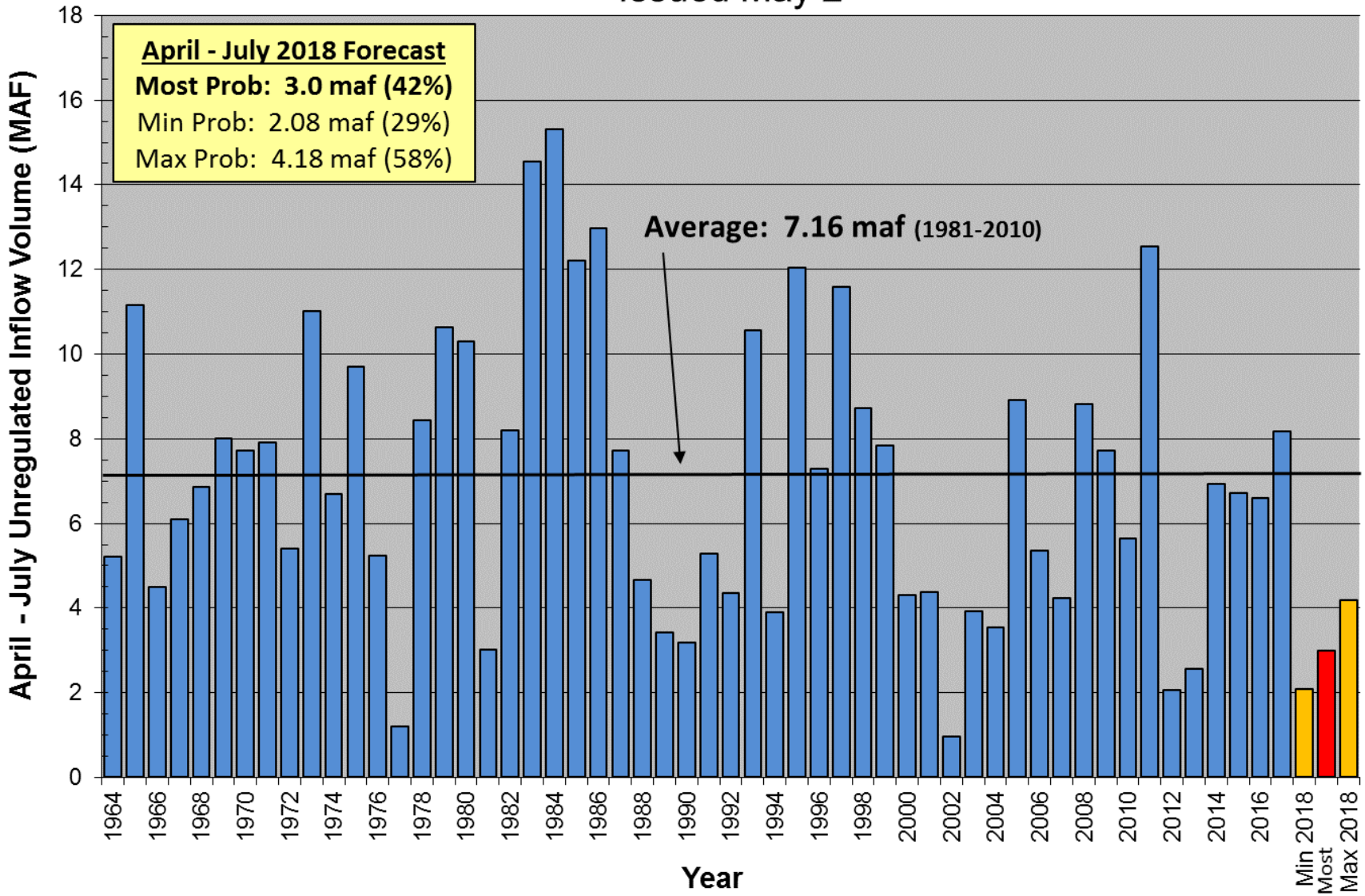
Lake Powell Unregulated Inflow
April - July 2018 Forecast
Issued May 2nd



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Projected Operations
Water Years 2018 and 2019

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Lake Powell & Lake Mead Operational Table

Operational Tiers for Water Year/Calendar Year 2018[1]

Lake Powell

Elevation (feet)	Operation According to the Interim Guidelines	Live Storage (maf)[1]
3,700	**Equalization Tier** Equalize, avoid spills or release 8.23 maf	24.3
3,636 - 3,666 (2008-2026)	**Upper Elevation Balancing Tier**[3] Release 8.23 maf; if Lake Mead < 1,075 feet, balance contents with a min/max release of 7.0 and 9.0 maf	15.5 - 19.3 (2008-2026)
3,627.34 ft **Jan 1, 2018 Projection**		
3,575	**Mid-Elevation Release Tier** Release 7.48 maf; if Lake Mead < 1,025 feet, release 8.23 maf	9.5
3,525		5.9
3,490	**Lower Elevation Balancing Tier** Balance contents with a min/max release of 7.0 and 9.5 maf	4.0
3,370		0

Lake Mead

Elevation (feet)	Operation According to the Interim Guidelines	Live Storage (maf)[1]
1,220	**Flood Control Surplus or Quantified Surplus Condition** Deliver > 7.5 maf	25.9
1,200 (approx.)[2]	**Domestic Surplus or ICS Surplus Condition** Deliver > 7.5 maf	22.9 (approx.)[2]
1,145	**Normal or ICS Surplus Condition** Deliver ≥ 7.5 maf	15.9
1,105		11.9
1,075	**Shortage Condition** Deliver 7.167[4] maf	9.4
1,050	**Shortage Condition** Deliver 7.083[5] maf	7.5
1,025	**Shortage Condition** Deliver 7.0[6] maf Further measures may be undertaken[7]	5.8
1,000		4.3
895		0

Diagram not to scale

[1] Acronym for million acre-feet

[2] This elevation is shown as approximate as it is determined each year by considering several factors including Lake Powell and Lake Mead storage, projected Upper Basin and Lower Basin demands, and an assumed inflow.

[3] Subject to April adjustments which may result in a release according to the Equalization Tier

[4] Of which 2.48 maf is apportioned to Arizona, 4.4 maf to California, and 0.287 maf to Nevada

[5] Of which 2.40 maf is apportioned to Arizona, 4.4 maf to California, and 0.283 maf to Nevada

[6] Of which 2.32 maf is apportioned to Arizona, 4.4 maf to California, and 0.280 maf to Nevada

[7] Whenever Lake Mead is below elevation 1,025 feet, the Secretary shall consider whether hydrologic conditions together with anticipated deliveries to the Lower Division States and Mexico is likely to cause the elevation at Lake Mead to fall below 1,000 feet. Such consideration, in consultation with the Basin States, may result in the undertaking of further measures, consistent with applicable Federal law.

[1] Lake Powell and Lake Mead operational tier determinations were based on August 2017 24-Month Study projections and are documented in the 2018 AOP.

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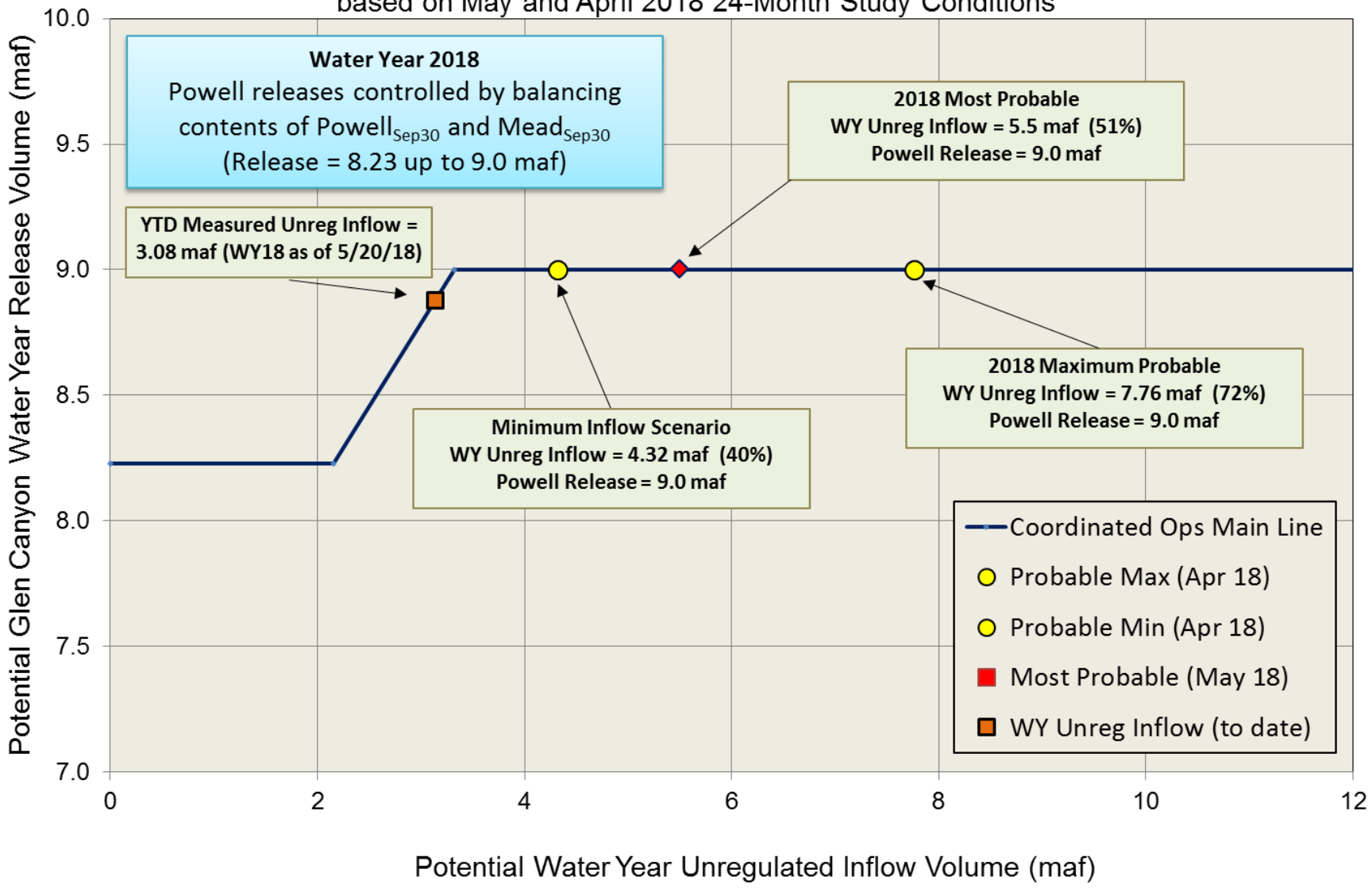
Potential Lake Powell Release Scenarios

Water Year 2018 Release Volume as a Function of Unregulated Inflow Volume
based on May and April 2018 24-Month Study Conditions



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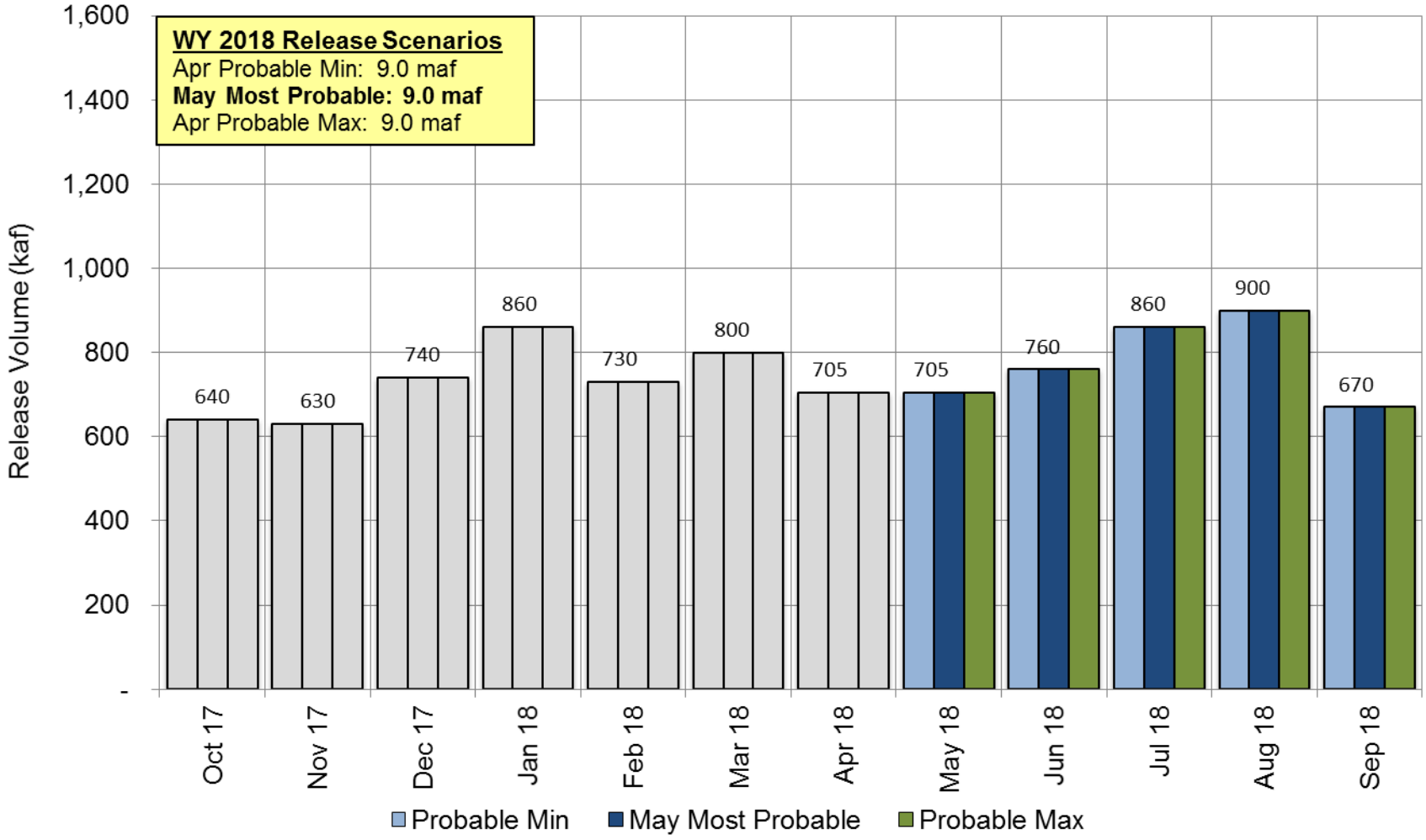
Projected Lake Powell Monthly Release Volume Distribution

Release Scenarios for Water Year 2018

Based on May and April 2018 modeling



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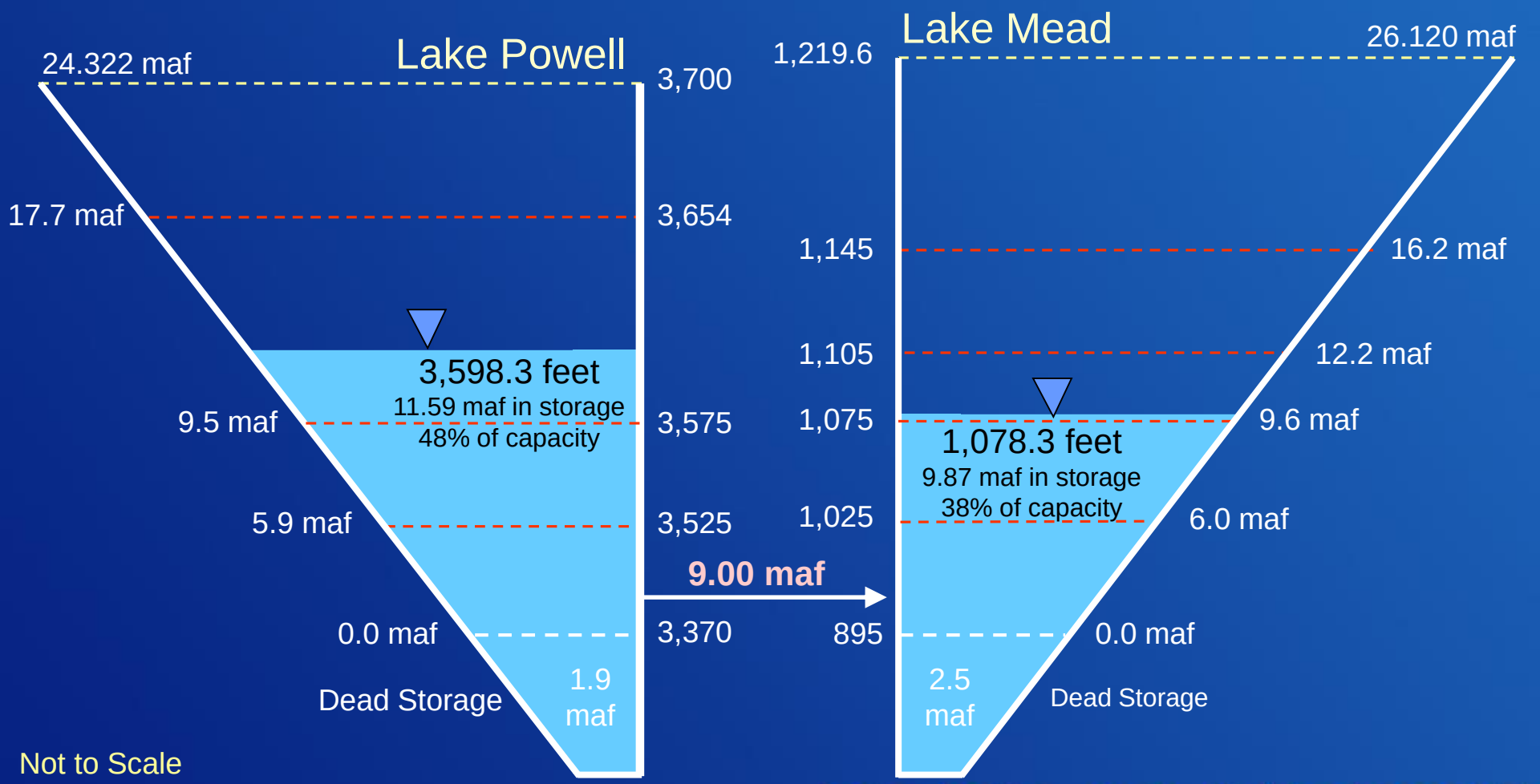
End of Water Year 2018 Projections

May 2018 24-Month Study Most Probable Inflow Scenario[1]

Projected Unregulated Inflow into Powell[1] = 5.50 maf (51% of average)



[1] WY 2018 unregulated inflow into Lake Powell is based on the CBRFC forecast dated 5/2/18.

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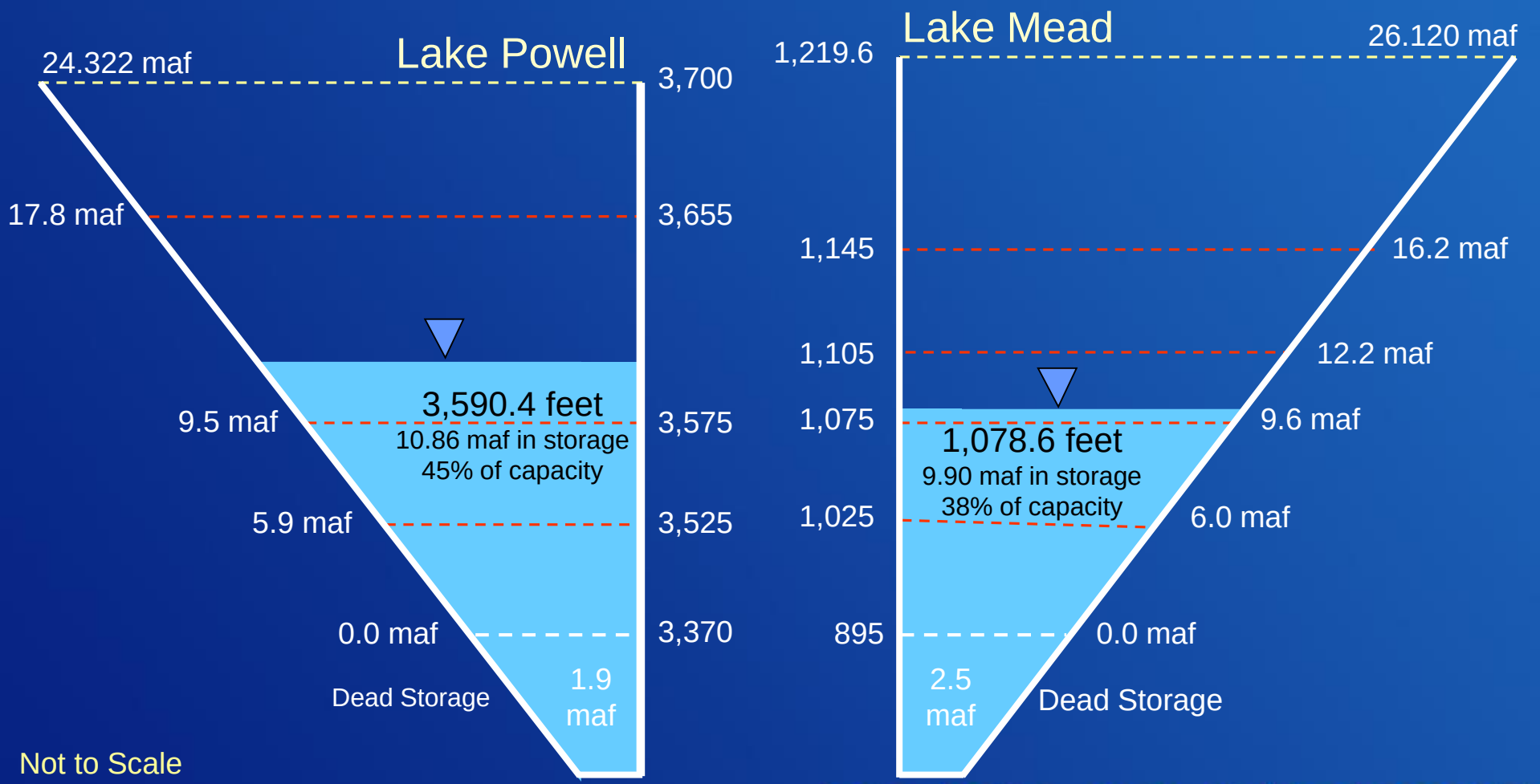
End of Calendar Year 2018 Projections

May 2018 24-Month Study Most Probable Inflow Scenario[1]

Based on 9.00 maf release patterns from Lake Powell in Water Years 2018 & 2019



Not to Scale

[1] WY 2018 unregulated inflow into Lake Powell is based on the CBRFC forecast dated 5/2/18.

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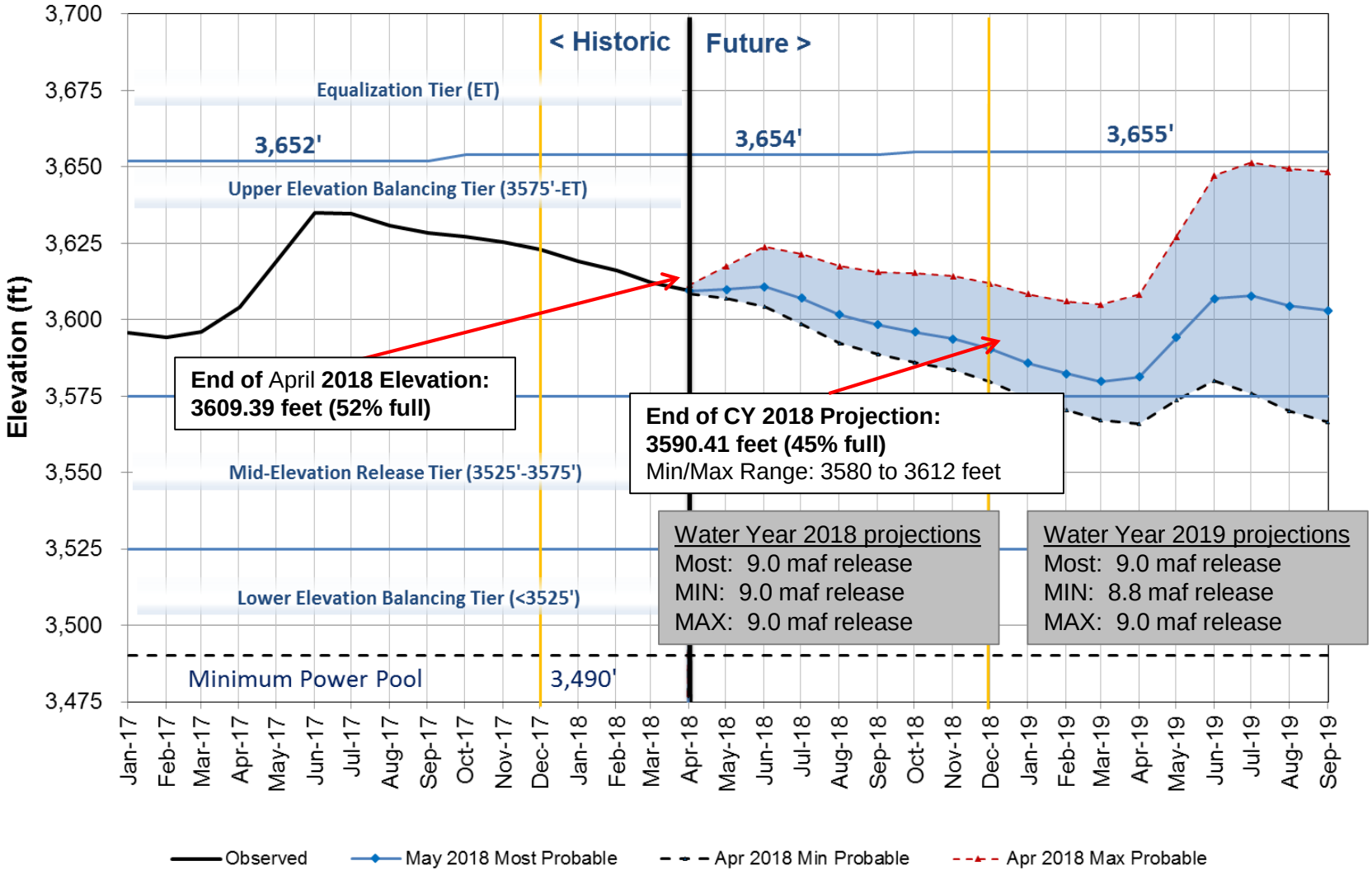
Lake Powell End of Month Elevations

Historic and Projected based on May and April 2018 Modeling



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Lake Powell 2019 Operating Tier Scenarios

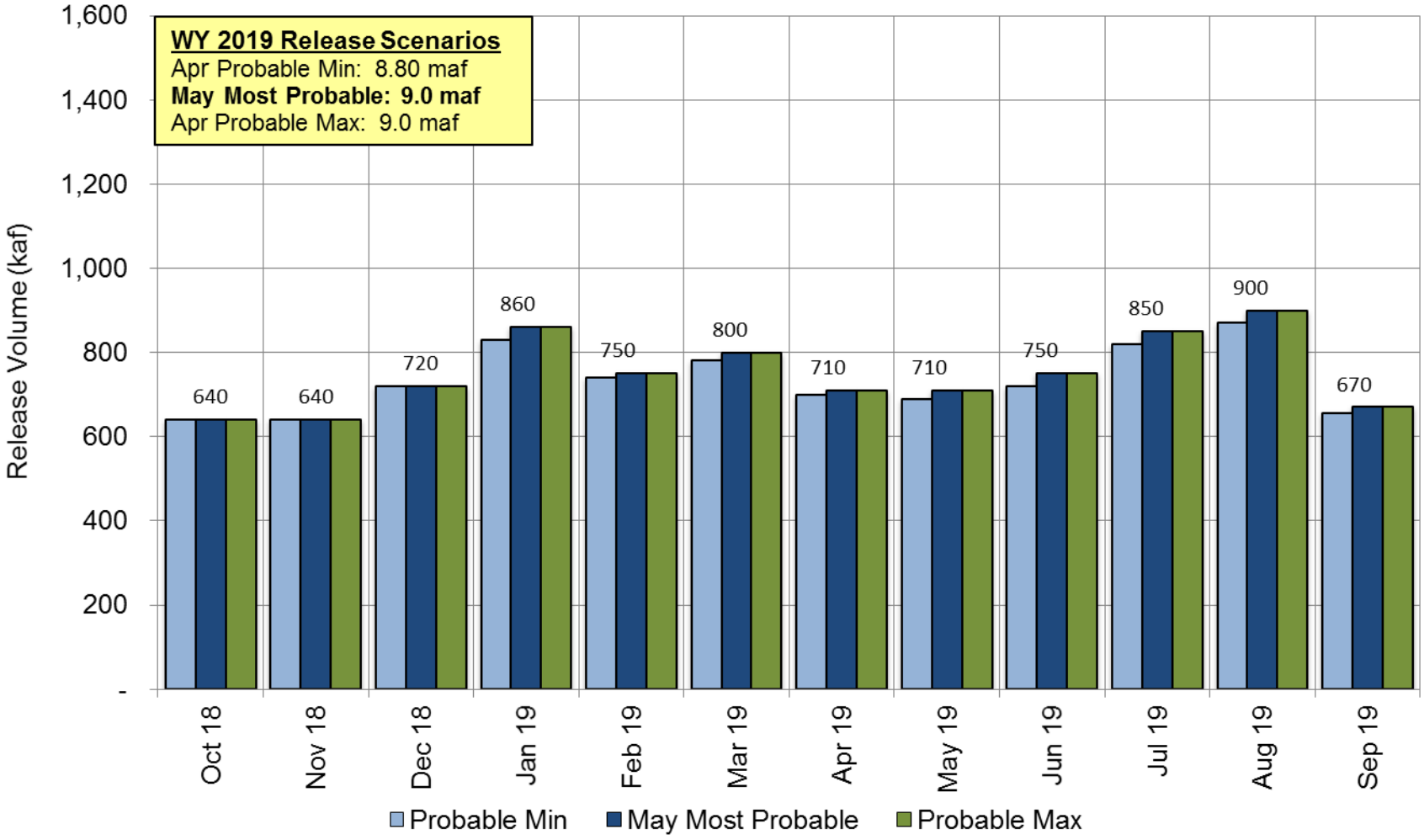
Based on April and May 2018 modeling

Inflow Scenario	**Operating Tier/ Release Volume**
Minimum Probable	Upper Elevation Balancing 8.80 maf
Most Probable	Upper Elevation Balancing 9.00 maf
Maximum Probable	Equalization 9.00 maf

RECLAMATION

Projected Lake Powell Monthly Release Volume Distribution

Release Scenarios for Water Year 2019
Based on May and April 2018 modeling



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Glen Canyon Power Plant Planned Unit Outage Schedule for Water Year 2019

Unit Number	Oct 2018	Nov 2018	Dec 2018	Jan 2019	Feb 2019	Mar 2019	Apr 2019	May 2019	Jun 2019	Jul 2019	Aug 2019	Sep 2019
1												
2												
3												
4												
5												
6												
7												
8												
Units Available	6	8	6	6	6	4/6	6	7	8	8	8	6
Capacity (cfs)	**19,100**	**26,100**	**19,100**	**19,100**	**19,100**	**12,200**	**19,000**	**22,700**	**26,100**	**26.100**	**26,100**	**19,100**
Capacity (kaf/month)	1,240	1,550	1,200	1,170	1,060	1,140	1,190	1,480	1,550	1,600	1,600	1,180
Max (kaf) [1]	640	640	720	860	750	800	710	710	750	850	900	670
Most (kaf) [2]	640	640	720	860	750	800	710	710	750	850	900	670
Min (kaf) [1]	640	640	720	820	730	760	690	680	710	810	860	644

9.0
9.0
8.7

1 Projected release, based on Apr 2018 Min and Max Probable Inflow Projections and 24-Month Study model runs

2 Projected release, based on Apr 2018 Most Probable Inflow Projections and 24-Month Study model runs

(updated 4-11-2018)

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Colorado River Basin Storage
(as of May 28, 2018)

Current Storage	Percent Full	MAF	Elevation (Feet)
Lake Powell	53%	12.84	3,611.1
Lake Mead	39%	10.07	1,080.8
Total System Storage*	51%	30.58	NA

***Total system storage was 53% or 31.56 maf this time last year**

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			1,145		15.9
			1,105	**Normal or ICS Surplus Condition** Deliver ≥ 7.5 maf **1,083.46 ft**	11.9
3,575		9.5	1,075	**Jan 1, 2018 Projection**	9.4
	Mid-Elevation Release Tier Release 7.48 maf; if Lake Mead < 1,025 feet, release 8.23 maf			**Shortage Condition** Deliver 7.167[4] maf	
			1,050		7.5
3,525		5.9		**Shortage Condition** Deliver 7.083[5] maf	
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	Lower Elevation Balancing Tier Balance contents with a min/max release of 7.0 and 9.5 maf			**Shortage Condition** Deliver 7.0[6] maf Further measures may be undertaken[7]	
3,490		4.0	1,000		4.3
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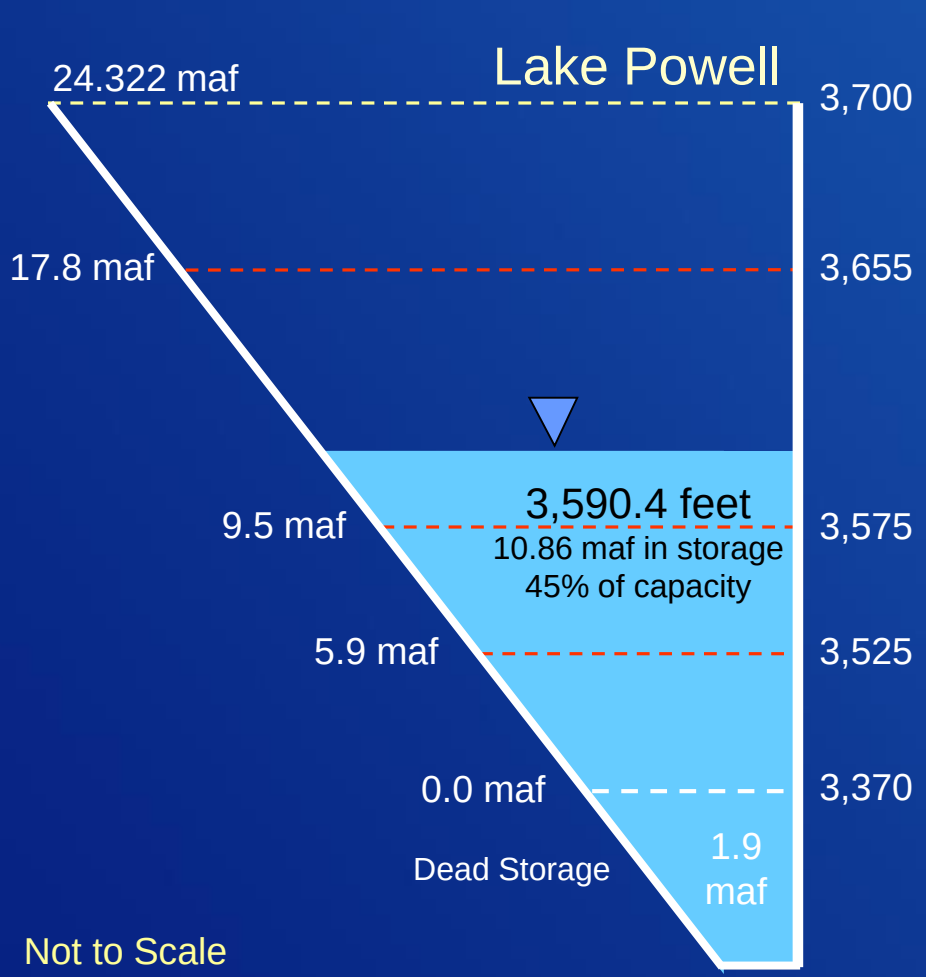

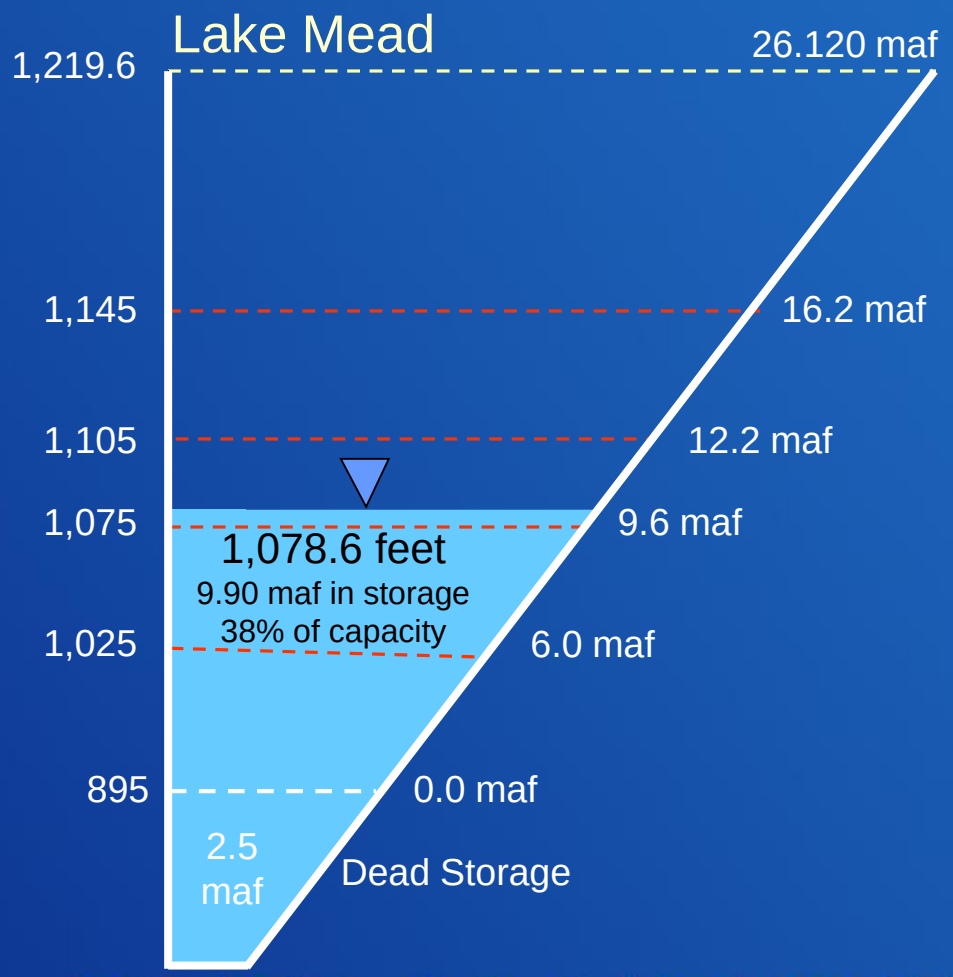

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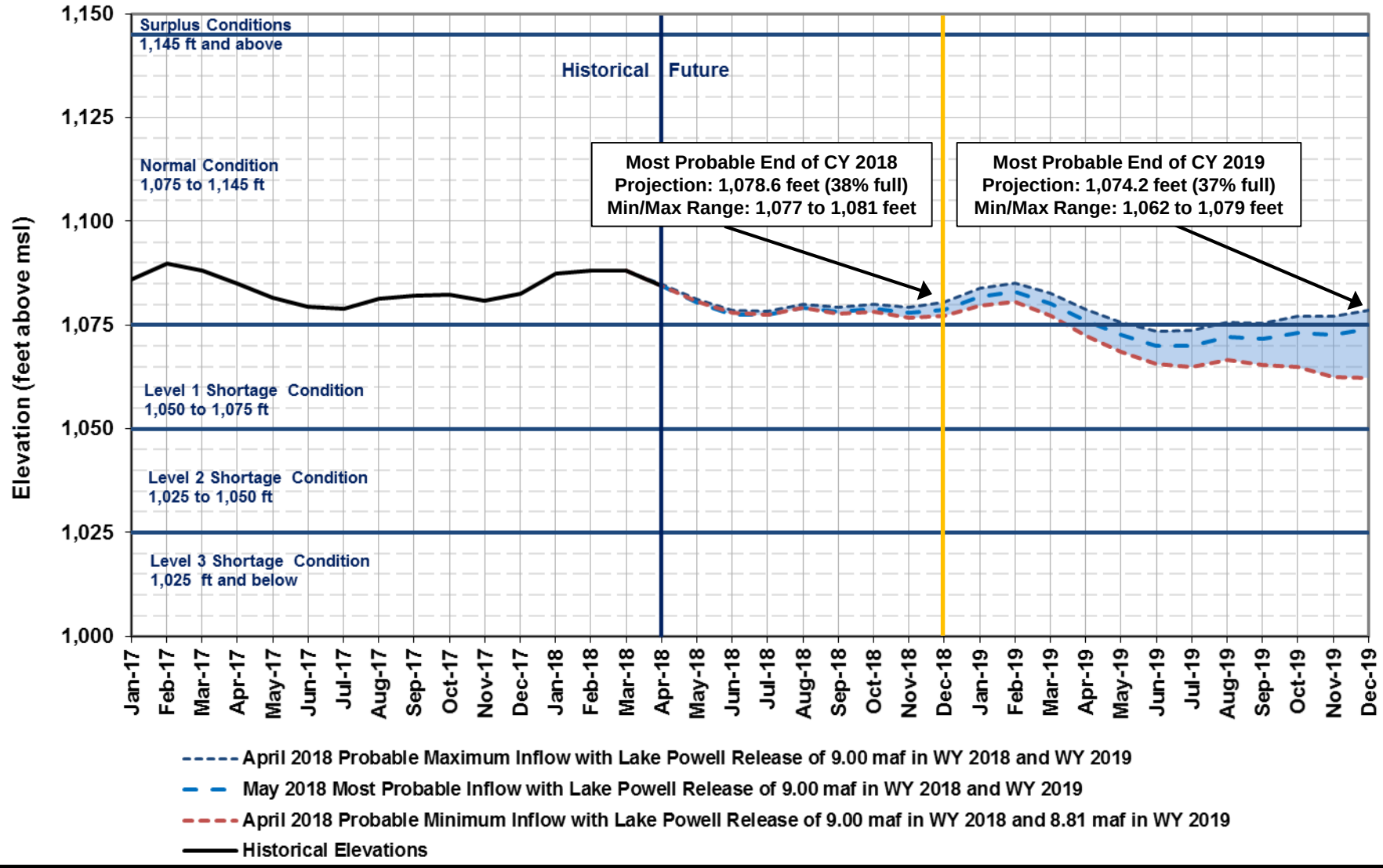
Lake Mead End of Month Elevations

Projections from the April and May 2018 24-Month Study Inflow Scenarios



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Lower Basin Side Inflows – WY/CY 2018[1,2]

Intervening Flow from Glen Canyon to Hoover Dam

	Month in WY/CY 2018	5-Year Average Intervening Flow (KAF)	Observed Intervening Flow (KAF)	Observed Intervening Flow (% of Average)	Difference From 5-Year Average (KAF)
HISTORICAL	October 2017	69	44	64%	-25
	November 2017	61	40	65%	-21
	December 2017	50	43	87%	-7
	January 2018	78	78	100%	0
	February 2018	93	60	65%	-33
	March 2018	56	70	124%	13
	April 2018	48	44	91%	-4
PROJECTED	May 2018	31			
	June 2018	12			
	July 2018	81			
	August 2018	112			
	September 2018	105			
	October 2018	69			
	November 2018	61			
	December 2018	50			
	WY 2018 Totals	796	720	90%	-76
	CY 2018 Totals	796	772	97%	-24

[1] Values were computed with the LC's gain-loss model for the most recent 24-month study.

[2] Percents of average are based on the 5-year mean from 2013-2017.

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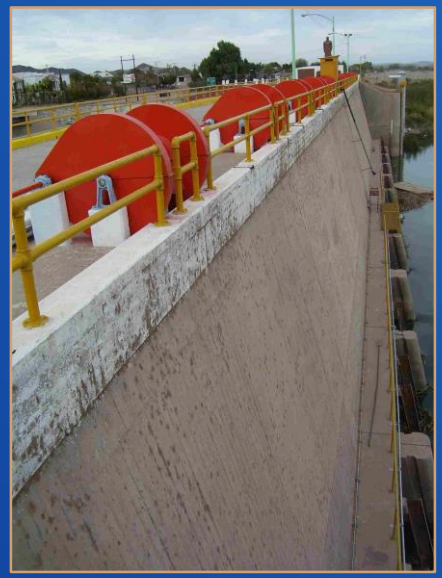
YAO Operations Update

- Brock Reservoir and Senator Wash 2018 YTD accumulated storage[1]
  - Brock 56,363 AF
  - Senator Wash 33,217 AF

- Excess Flows to Mexico

  2018 YTD total[2] 516 AF



[1] Provisional year-to-date total through May 27, 2018

[2] Provisional year-to-date total through May 28, 2018

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YAO Operations Update

- Pumped drainage return flows from the Wellton-Mohawk Irrigation and Drainage District
  - Flow at station 0+00 on the Main Outlet Drain from January through March 2018 was 24,331 AF at 2,502 ppm
- Provisional drainage flows to the Colorado River
  - From the South Gila Drainage Wells January through April 2018 was 20,799 AF at 1,704 ppm
  - From the Yuma Mesa Conduit January through April 2018 was 7,795 AF at 1666 ppm

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